Advances in Environmental Research, *Vol. 7, No. 3 (2018) 201-212*
DOI: https://doi.org/10.12989/aer.2018.7.3.201

Determination of antibiotics by SPE-LC-MS/MS in wastewater and risk assessment

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(Received June 1, 2018, Revised February 8, 2019, Accepted February 20, 2019)

Abstract. In this study, conditions of solid phase extraction (SPE) for determination of some antibiotics such as trimethoprim, oxytetracycline, erythromycin, clarithromycin, azythromycin, doxycycline, sulfamethazine, ciprofloxacin, chlortetracycline, sulfamethoxazole in wastewaters were optimized. After the optimum volume and pH of the sample were determined, the effect of the concentration of the compounds and matrix were investigated. The highest recovery rates for antibiotic compounds were determined between 82% and 105% in 200 mL sample volume and pH 2.5. Then, antibiotic compounds were investigated in influent and effluent samples taken from Konya Urban Wastewater Treatment Plant. The concentration of the antibiotics was detected range of 0.11-101 ng/L in influent waters and <dl-288 ng/L in effluent samples in wastewater treatment plant. Hazard quotients (HQs) of antibiotic compounds determined in WWTP effluents to evaluate the risk towards different aquatic organisms (algae, *Daphnia magna* and fish) were determined. Azythromycin for fish and erythromycin, sulfamethoxazole, ciprofloxacin, clarithromycin for algae posed a moderate risk while azythromycin, ciprofloxacin, clarithromycin, oxytetracycline posed a high risk for algae in the receiving environment.

Keywords: antibiotic; LC-MS/MS; risk assessment; SPE, wastewater

1. Introduction

Pharmaceuticals are groups of chemical substance having medical features. Wastewater treatment plant effluents, groundwater and surface water may involve 160 types of drugs. In fact, even pharmaceuticals in drinking water are encountered. Nowadays, pharmaceuticals have become indispensable and important element in areas such as medicine, veterinary, agriculture. In the 1970s, information on the presence of pharmaceuticals in nature has begun to emerge in recent years and their effects on behavior studies were started in the 1990s. The main source of pharmaceutical compounds is the metabolic wastes of patients going to the sewerage system. These contaminants are excreted by fecal and urinary because of not to be fully metabolized by humans and animals. In generally, it is assumed that the hospital wastewater has the same pollutant

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http://www.techno-press.org/?journal=aer&subpage=7 ISSN: 2234-1722 (Print), 2234-1730 (Online)

determination of 13 quinolone antibiotic derivatives in wastewater samples using solid phase extraction and ultraperformance liquid chromatography-tandem mass spectrometry", *Microchem. J*., **106**, 323-333.

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